Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS E. MADDEN, BRIAN E. MITTELSTAEDT, W. HENRIETTA and EDWARD J. GIORGIANNI

Appeal No. 1998-2679
Application No. 08/148,765

ON BRIEF

Before HECKER, LALL and BARRY, Administrative Patent Judges.

LALL, Administrative Patent Judge.

DECISION ON APPEAL

This is decision on appeal under 35 U.S.C. § 134 from the final rejection[1] of claims 1-3 and 5-10. Claim 4 has been canceled.

The invention relates to the art of color processing and particularly to the art of transforming color images to

[1] An amendment after the final rejection was filed as Paper No. 9 and its entry approved by the Examiner, Paper No. 10. As a result, the rejections based under U.S.C. § 112, first paragraph, has been withdrawn by the Examiner leaving behind only the rejection under 35 U.S.C. § 102.

improve the shadow-to-highlight characteristics of both neutral and colored images during reproduction. The shadow-to-highlight characteristic of color images typically corresponds to the changes in the perceived image when the image includes objects containing both brightly lit (highlight) areas and shadow areas. Each of the devices, a cathode ray tube (CRT) or a scanner, includes what is called a color space or color metric. Typically, for scanners it is scanner RGB (Red, Green, Blue), for CRT's it is CRT RGB and for printers it is printer CMY (Cyan, Magenta, Yellow). RGB and CMY represent the "color primaries" that define the color space or color metric. These color spaces are therefore defined by the color primaries of the devices. The different spaces have different characteristics. For example, a particular color, say purple, in the RBG type spaces is created by adding together the three primaries RGB in different amounts, such that RGB spaces are called "additive" spaces. In contrast, the same color in a CMY space is created by using the primary dyes of the printer to further or subject-out light incident on the print and is called a subtractive. To print an image that is input by a scanner requires that the original RGB image be transformed into a

printable CMY image. Other types of color spaces exist that are not defined by color primaries but which are defined by other characteristics. For example, the color space u'v'L* is a color coordinate space defined by chromaticity coordinates (u'v' [hue and saturation respectively] in which equal differences approximately represent equal perceived color differences for color stimuli having the same luminance and CIE psychometric lightness function (L*). Another space is the L*a*b* color coordinates space where again, equal differences in a* and b* present approximately equal perceived color differences for color stimuli having the same luminance. Because the defining characteristics of the various color spaces are different, transforms within the color spaces are different. The present invention takes advantage of the different characteristics of the color spaces to process images to improve the shadow-to-highlight characteristics for both neutral and colored objects contained within the image. In the transform from one color space, say scanner RGB, to another color space, say printer CMY, it is common to apply some sort of nonlinear transformation that is designed to compensate for physical and psychophysical factors affecting appearance of the reproduced image. This transform is

typically performed in the input device space or the output device space. The problem is that the series depicted by 74 and 75 or Figure 7B of the specification represent images that have very undesirable characteristics, such as objectionable changes in the reproduced hues of image objects as they move from shadow light to highlight. The present invention solves the problem noted above by converting the image to an "intermediary" color space in performing the nonlinear "transform" in that intermediary color space or metric. The intermediary color space is not just any intermediary color space but one which defines "color primaries" and one in which the "colorimetric properties" are "intermediary" to, or "different" from, or unassociated with, those of the input and output devices. The invention is further illustrated by the following claim.

1. A method for transforming color-image signals corresponding to a first set of color primaries to color-image signals corresponding to a second set of color primaries, comprising the steps of:

a. inputting a color image represented by color-image signals, using an input device, the color-image signals having first colorimetric properties including a chromaticity gamut;

b. transforming all the color-image signals corresponding to the first set of color primaries to form intermediary color-image signals corresponding to a third set

of color primaries and having second colorimetric properties different from said first colorimetric properties;

c. applying a transform to each of said intermediary color-image signals to form modified intermediary color-image signals having consistent shadow-to-highlight characteristics for colored objects within, coincident with and outside the chromatically (sic, chromaticity) gamut; and

d. transforming all said modified intermediary color-image signals to form color-image signals corresponding to said second set of color primaries.

The Examiner relies on the following reference:

Newman et al. (Newman) 5,432,906 July 11, 1995
(effective filing date Sept. 28, 1990)

Claims 1-3 and 5-10 stand rejected under 35 U.S.C. § 102 as being anticipated by Newman.

Rather than repeat the positions and the arguments of Appellants and the Examiner, we make reference to the briefs[2] and the answers for the respective positions.

OPINION

[2] A reply brief (Paper No. 15) and a Supplemental Reply Brief (Paper No. 17) were filed. Both have been entered into the record. A Supplemental Examiner's Answer was mailed as Paper No. 16, however, no further arguments by the Examiner were made in response to the supplemental reply brief.

We have considered the rejections advanced by the Examiner. We have, likewise, reviewed Appellants' arguments against the rejections as set forth in the briefs.

It is our view, after consideration of the record before us, that the rejection under 35 U.S.C. § 102 is not proper. Accordingly, we reverse.

ANALYSIS

As the outset we note that Appellants have elected that claims 1-3 and 5-10 are each independently patentable over Newman and do not stand or fall together.

We have carefully reviewed the position of the Examiner, [answer, pages 3-8 and supplemental Examiner's answer, pages 1-2], and the position of Appellants [Brief, pages 6-14 and Exhibits A-E, reply brief, pages 1-5 and supplemental reply brief, pages 1-10 with enhanced exhibits from the brief, (the Hunt exhibit and the Billmeyer Jr. et al. exhibit)]. We reach a conclusion that the Examiner is over-reaching in his effort to reject the claims on appeal. Whereas we commend the Examiner in answering each and every point which Appellants have raised in their briefs, we are of the view that the Examiner is stretching his reasoning to meet the claimed limitations. We add below some elaboration for clarification.

REJECTION UNDER 35 U.S.C. § 102

A prior art reference anticipates the subject of a claim when the reference discloses every feature of the claimed invention, either explicitly or inherently, See Hazani v.

Int'l Trade Comm'n, 126 F.3d 1473, 1477, 44 USPQ2d 1358, 1361

(Fed.

Cir. 1997) and RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984).

In our opinion, there is a fundamental difference between the understandings of Appellants and the Examiner regarding the expressing of color characteristics of an image in terms of primary color coordinates, or in terms of the other colorimetric space variables. To illustrate the point we consider the broadest claim, 9, in our discussion. We focus on the limitation "transforming all the color-image signals corresponding to the first set of color primaries to form intermediary color-image signals corresponding to a third set of color primaries." The Examiner asserts, answer at page 3, that "transforming the color image signals corresponding to the first set of color primaries to form intermediary color-image signals corresponding to a third set of color primaries" is shown by Newman at column 5, lines 41-65. Appellants argue, brief at page 11, that "Newman transforms [the color image signals] to a non-primary space in which additional transforms are performed." More specifically, Appellants argue, reply brief at page 3, that "[i]n column 5, lines 37-39[,] Newman also notes that transformation from RGB space

into u'v'L* space is a transformation to a different 'reference' color space and in fact a space that is called a 'perceptually based color space.' This is a transform from a set of color primaries (RGB) to a set of color parameters in (u'v'L*) which are not color primaries." The Examiner counters, supplemental answer at page 2, that "the formulas [regarding the color primaries] that Appellant (sic) has given on page 12 of the specification appear to be color parameters, in the same since (sic, sense) as Newman's, and are not color primaries as defined in the fields of color science." Appellants, in supplemental reply brief at page 3 and Figure A attached to the supplemental reply brief, show how the primary colors (RGB) can be expressed in terms of color parameters u'v', as is also explained in the specification at page 12, which the Examiner has referred to in his arguments.

We do not agree with the Examiner's inference that since the specification shows the expressing of "primaries" in terms of color parameters u'v', Newman's system operates using the same CIE standard and operates in a color space based on u'v'. See page 2 of the supplemental examiner's answer. We find that the Examiner's analysis is misplaced because the

specification at page 12 simply shows how the primary colors can be expressed in terms of the color parameters, and not that the u'v' are used in place of the color primaries in the transformation of color images into the "intermediate color primaries." We agree with Appellants that Newman does not disclose the transformation of color-image signals into the color primaries space. Therefore, Newman does not meet the above recited limitation of claim 9. Thus, we do not sustain the anticipation rejection of claim 9 by Newman.

All the other claims on appeal, claims 1-3, 5-8 and 10, each have the limitation we have discussed above. Therefore, for the same rationale, we do not sustain the anticipation rejection of these claims by Newman.

In conclusion, we reverse the Examiner's final rejection under 35 U.S.C. § 102 of claims 1-3 and 5-10.

REVERSED

STUART N. HECKER Administrative Patent Judge	)	
PARSHOTAM S. LALL	)	BOARD OF PATENT APPEALS

Administrative Patent Judge	)	AND
	)	INTERFERENCES
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LANCE LEONARD BARRY	)	
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